

# Memoria Grupo AHEP 2023

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## Publicaciones en revistas indexadas Web of Science en 2023

### Publicaciones en física teórica

1. *Lepton PDFs and multipurpose single-lepton searches at the LHC*  
H.K. Dreiner, **V. Martín Lozano**, S. Nangia, T. Opferkuch  
Physical Review D **107** (2023) 035011 [arXiv:2112.12755]  
DOI: 10.1103/PhysRevD.107.035011
2. *Constraining nonstandard interactions with coherent elastic neutrino-nucleus scattering at the European Spallation Source*  
S.S. Chatterjee, S. Lavignac, O.G. Miranda, **G. Sánchez García**  
Physical Review D **107** (2023) 055019 [arXiv:2208.11771]  
DOI: 10.1103/PhysRevD.107.055019
3. *Neutrino masses, flavor anomalies, and muon  $g-2$  from dark loops*  
R. Cepedello, **P. Escribano, A. Vicente**  
Physical Review D **107** (2023) 035034 [arXiv:2209.02730]  
DOI: 10.1103/PhysRevD.107.035034
4. *Long-lived heavy neutral leptons from mesons in effective field theory*  
**R. Beltrán**, G. Cottin, J.C. Helo, **M. Hirsch**, A. Titov, Z.S. Wang  
Journal of High Energy Physics **01** (2023) 015 [arXiv:2210.02461]  
DOI: 10.1007/JHEP01(2023)015
5. *Dark matter in the scotogenic model with spontaneous lepton number violation*  
**V. De Romeri, J. Nava, M. Puerta, A. Vicente**  
Physical Review D **107** (2023) 095019 [arXiv:2210.07706]  
DOI: 10.1103/PhysRevD.107.095019
6. *Long-lived heavy neutral leptons with a displaced shower signature at CMS*  
G. Cottin, J.C. Helo, **M. Hirsch**, C. Peña, C. Wang, S. Xie  
Journal of High Energy Physics **02** (2023) 011 [arXiv:2210.17446]  
DOI: 10.1007/JHEP02(2023)011
7. *Non-unitary three-neutrino mixing in the early Universe*  
S. Gariazzo, **P. Martínez-Miravé**, O. Mena, **S. Pastor, M. Tórtola**  
Journal of Cosmology and Astroparticle Physics **03** (2023) 046 [arXiv:2211.10522]  
DOI: 10.1088/1475-7516/2023/03/046
8. *Physics implications of a combined analysis of COHERENT CsI and LAr data*  
**V. De Romeri**, O.G. Miranda, D.K. Papoulias, **G. Sánchez García, M. Tórtola, J.W.F. Valle**  
Journal of High Energy Physics **04** (2023) 035 [arXiv:2211.11905]  
DOI: 10.1007/JHEP04(2023)035

9. *Revamping Kaluza-Klein dark matter in an orbifold theory of flavor*  
F.J. de Anda, **O. Medina**, **J.W.F. Valle**, C.A. Vaquera-Araujo  
Physical Review D **108** (2023) 035046 [arXiv:2212.09174]  
DOI: 10.1103/PhysRevD.108.035046
10. *Ultraviolet extensions of the Scotogenic model*  
D. Portillo-Sánchez, **P. Escribano**, **A. Vicente**  
Journal of High Energy Physics **08** (2023) 023 [arXiv:2301.05249]  
DOI: 10.1007/JHEP08(2023)023
11. *Discrete dark matter mechanism as the source of neutrino mass scales*  
C. Bonilla, J. Herms, **O. Medina**, E. Peinado  
Journal of High Energy Physics **06** (2023) 078 [arXiv:2301.10811]  
DOI: 10.1007/JHEP06(2023)078
12. *Reinterpretation of searches for long-lived particles from meson decays*  
**R. Beltrán**, G. Cottin, **M. Hirsch**, A. Titov, Z.S. Wang  
Journal of High Energy Physics **05** (2023) 031 [arXiv:2302.03216]  
DOI: 10.1007/JHEP05(2023)031
13. *SMEFT goes dark: Dark Matter models for four-fermion operators*  
R. Cepedello, F. Esser, **M. Hirsch**, V. Sanz  
Journal of High Energy Physics **09** (2023) 081 [arXiv:2302.03485]  
DOI: 10.1007/JHEP09(2023)081
14. *A new LHC search for dark matter produced via heavy Higgs bosons using simplified models*  
D. Perez Adan, H. Bahl, A. Grohsjean, **V. Martín Lozano**, C. Schwanenberger, G. Weiglein  
Journal of High Energy Physics **08** (2023) 151 [arXiv:2302.04892]  
DOI: 10.1007/JHEP08(2023)151
15. *Dark-sector seeded solution to the strong CP problem*  
H.B. Câmara, F.R. Joaquim, **J.W.F. Valle**  
Physical Review D **108** (2023) 095003 [arXiv:2303.00705]  
DOI: 10.1103/PhysRevD.108.095003
16. *Phenomenology of the simplest linear seesaw mechanism*  
A. Batra, P. Bharadwaj, S. Mandal, R. Srivastava, **J.W.F. Valle**  
Journal of High Energy Physics **07** (2023) 221 [arXiv:2305.00994]  
DOI: 10.1007/JHEP07(2023)221
17. *Linear seesaw mechanism from dark sector*  
A.E. Cárcamo Hernández, Vishnudath K.N., **J.W.F. Valle**  
Journal of High Energy Physics **09** (2023) 046 [arXiv:2305.02273]  
DOI: 10.1007/JHEP09(2023)046
18. *COHERENT production of a dark fermion*  
**P.M. Candela**, **V. De Romeri**, D.K. Papoulias  
Physical Review D **108** (2023) 055001 [arXiv:2305.03341]  
DOI: 10.1103/PhysRevD.108.055001

19. *Neutrino CPT violation in the solar sector*  
G. Barenboim, **P. Martínez-Miravé**, C.A. Ternes, **M. Tórtola**  
Physical Review D **108** (2023) 035039 [arXiv:2305.06384]  
DOI: 10.1103/PhysRevD.108.035039
20. *Scotogenic explanation for the 95 GeV excesses*  
**P. Escribano**, **V. Martín Lozano**, **A. Vicente**  
Physical Review D **108** (2023) 115001 [arXiv:2306.03735]  
DOI: 10.1103/PhysRevD.108.115001
21. *The ABC of RPV: classification of R-parity violating signatures at the LHC for small couplings*  
H.K. Dreiner, Y.S. Koay, D. Köhler, **V. Martín Lozano**, J. Montejo Berlingen, S. Nangia, N. Strobbe  
Journal of High Energy Physics **07** (2023) 215 [arXiv:2306.07317]  
DOI: 10.1007/JHEP07(2023)215
22. *Tree-level UV completions for  $N_R$  SMEFT  $d=6$  and  $d=7$  operators*  
**R. Beltrán**, R. Cepedello, **M. Hirsch**  
Journal of High Energy Physics **08** (2023) 166 [arXiv:2306.12578]  
DOI: 10.1007/JHEP08(2023)166
23. *Neutrino oscillation bounds on quantum decoherence*  
**V. De Romeri**, C. Giunti, T. Stuttard, C.A. Ternes  
Journal of High Energy Physics **09** (2023) 097 [arXiv:2306.14699]  
DOI: 10.1007/JHEP09(2023)097
24. *Radiative neutrino masses and the Cohen-Kaplan-Nelson bound*  
A. Adolf, **M. Hirsch**, H. Päs  
Journal of High Energy Physics **11** (2023) 078 [arXiv:2306.15313]  
DOI: 10.1007/JHEP11(2023)078
25. *Phenomenological profile of scotogenic fermionic dark matter*  
A. Karan, S. Sadhukhan, **J.W.F. Valle**  
Journal of High Energy Physics **12** (2023) 185 [arXiv:2308.09135]  
DOI: 10.1007/JHEP12(2023)185

### Publicaciones en el marco de grandes colaboraciones internacionales

1. *The Forward Physics Facility at the High-Luminosity LHC*  
J.L. Feng et al [incluye a **M. Hirsch**]  
Journal of Physics G **50** (2023) 030501 [arXiv:2203.05090]  
DOI: 10.1088/1361-6471/ac865e
2. *Synergy between cosmological and laboratory searches in neutrino physics*  
M. Gerbino et al [incluye a **P. Martínez-Miravé**, **M. Tórtola** y **J.W.F. Valle**]  
Physics of the Dark Universe **42** (2023) 101333 [arXiv:2203.07377]  
DOI: 10.1016/j.dark.2023.101333
3. *Reconstruction of interactions in the ProtoDUNE-SP detector with Pandora*  
DUNE collaboration, A. Abed Abud et al [incluye a **V. De Romeri**, **P. Martínez-Miravé**,

**M. Tórtola y J.W.F. Valle]**  
European Physical Journal C **83** (2023) 618 [arXiv:2206.14521]  
DOI: 10.1140/epjc/s10052-023-11733-2

4. *Identification and reconstruction of low-energy electrons in the ProtoDUNE-SP detector*  
DUNE collaboration, A. Abed Abud et al [incluye a **V. De Romeri, P. Martínez-Miravé, M. Tórtola y J.W.F. Valle]**  
Physical Review D **107** (2023) 092012 [arXiv:2211.01166]  
DOI: 10.1103/PhysRevD.107.092012
5. *Highly-parallelized simulation of a pixelated LArTPC on a GPU*  
DUNE collaboration, A. Abed Abud et al [incluye a **V. De Romeri, P. Martínez-Miravé, M. Tórtola y J.W.F. Valle]**  
Journal of Instrumentation **18** (2023) P04034 [arXiv:2212.09807]  
DOI: 10.1088/1748-0221/18/04/P04034
6. *Impact of cross-section uncertainties on supernova neutrino spectral parameter fitting in the Deep Underground Neutrino Experiment*  
DUNE collaboration, A. Abed Abud et al [incluye a **V. De Romeri, P. Martínez-Miravé, M. Tórtola y J.W.F. Valle]**  
Physical Review D **107** (2023) 112012 [arXiv:2303.17007]  
DOI: 10.1103/PhysRevD.107.112012

## Ponencias y comunicaciones a congresos

1. *Diagrammatica: Systematic deconstruction of EFT operators*  
M. Hirsch  
8th International Conference on High Energy Physics in the LHC Era (HEP 2023)  
Valparaíso (Chile), 9-13 enero
2. *Neutrino physics update*  
J.W.F. Valle  
8th International Conference on High Energy Physics in the LHC Era (HEP 2023)  
Valparaíso (Chile), 9-13 enero
3. *Neutrino mass models: Overview*  
M. Hirsch  
SAPHIR Annual Research Meeting (ARM 2023) - Theory Meets Experiment  
La Serena (Chile), 18-20 enero
4. *Neutrino pathways to new physics*  
J.W.F. Valle  
SAPHIR Annual Research Meeting (ARM 2023) - Theory Meets Experiment  
La Serena (Chile), 18-20 enero
5. *Theoretical overview on Finding the underlying symmetries behind the fundamental components of matter*  
A. Vicente  
Workshop CSIC Strategic Theme “Understanding the basic components of the Universe, its

- structure and evolution”  
 Madrid, 22-23 febrero
6. *Model building for dark matter*  
 A. Vicente  
 Jornadas Científicas del IFIC: Line 4, Baryogenesis, dark matter and cosmic messengers  
 IFIC Valencia, 1 marzo
  7. *Neutrino physics benchmarks for colliders (virtual)*  
 J.W.F. Valle  
 Workshop on High Energy Physics LISHEP 2023  
 Rio de Janeiro (Brasil), 6-10 marzo
  8. *A solar electron antineutrino flux from neutrino magnetic moments*  
 P. Martínez-Miravé  
 CERN Neutrino Platform Pheno Week 2023  
 Ginebra (Suiza), 13-17 marzo
  9. *New physics implications of COHERENT CsI+LAr data*  
 V. De Romeri  
 Magnificent CEvNS workshop 2023  
 Múnich (Alemania), 22-24 marzo
  10. *Current and future sensitivities to Non-Standard Interactions using CEvNS*  
 G. Sánchez García  
 Magnificent CEvNS workshop 2023  
 Múnich (Alemania), 22-24 marzo
  11. *Long-lived heavy neutral leptons in effective field theory*  
 M. Hirsch  
 7th Red LHC workshop  
 IFT Madrid, 10-12 mayo
  12. *Collider signals of Scotogenic models*  
 A. Vicente  
 7th Red LHC workshop  
 IFT Madrid, 10-12 mayo
  13. *Neutrino masses and mixing*  
 M. Tórtola  
 34th Rencontres de Blois on Particle Physics and Cosmology  
 Blois (Francia), 14-19 mayo
  14. *Overview of searches, prospects, what are we missing?*  
 V. Martín Lozano  
 11th Large Hadron Collider Physics Conference (LHCP 2023)  
 Belgrado (Serbia), 22-26 mayo
  15. *Signatures of primordial black hole dark matter at DUNE and THEIA*  
 V. De Romeri

- New Horizons in Primordial Black Hole physics (NEHOP)  
Nápoles (Italia), 19-21 junio
16. *Reinterpretation of searches of LLPs from meson decays*  
R. Beltrán  
Searching for long-lived particles at the LHC and beyond: 13th workshop of the LLP Community  
CERN, Ginebra (Suiza), 19-23 junio
  17. *Neutrino mass ordering from discrete flavor symmetry*  
O. Medina  
28th International Symposium on Particles, Strings and Cosmology (PASCOS 2023)  
Irvine (Estados Unidos), 26-30 junio
  18. *CEvNS data from COHERENT may shed some light on the production of a possible dark fermion*  
P. Muñoz Candela  
ISAPP 2023: Neutrino physics, astrophysics and cosmology  
Varenna (Italia), 27 junio – 6 julio
  19. *Higgs lepton flavor violating decays*  
A. Vicente  
29th International Workshop on Weak Interactions and Neutrinos (WIN 2023)  
Zhuhai (China), 3-8 julio
  20. *Testing CPT with the solar neutrino sector*  
P. Martínez-Miravé  
COST CA18108 Fourth Annual Conference  
Rijeka (Croacia), 11-14 julio
  21. *Long-lived particles from neutrino mass models at LHC*  
M. Hirsch  
30th Int. Conf. on Supersymmetry and Unification of Fundamental Interactions (SUSY 2023)  
Southampton (Reino Unido), 17-21 julio
  22. *The legacy of neutrino oscillations*  
J.W.F. Valle  
30th Int. Conf. on Supersymmetry and Unification of Fundamental Interactions (SUSY 2023)  
Southampton (Reino Unido), 17-21 julio
  23. *Neutrinos: At the dawn of a revolution?*  
J.W.F. Valle  
21st Lomonosov Conference on Particle Physics  
charla remota, 24-30 agosto
  24. *Neutrino decoupling in standard and non-standard scenarios*  
P. Martínez-Miravé  
18th Int. Conference on Topics in Astroparticle and Underground Physics (TAUP 2023)  
Viena (Austria), 28 agosto - 1 septiembre
  25. *Testing CPT invariance with the neutrino solar sector*  
P. Martínez-Miravé

- 18th Int. Conference on Topics in Astroparticle and Underground Physics (TAUP 2023)  
Viena (Austria), 28 agosto - 1 septiembre
26. *Sensitivity of Coherent Elastic Neutrino-Nucleus Scattering experiments to Non-Standard Interactions*  
G. Sánchez García  
18th Int. Conference on Topics in Astroparticle and Underground Physics (TAUP 2023)  
Viena (Austria), 28 agosto - 1 septiembre
27. *New physics implications of COHERENT data*  
V. De Romeri  
18th Int. Conference on Topics in Astroparticle and Underground Physics (TAUP 2023)  
Viena (Austria), 28 agosto - 1 septiembre
28. *Exploring neutrino electromagnetic properties with CEvNS*  
M. Tórtola  
18th Int. Conference on Topics in Astroparticle and Underground Physics (TAUP 2023)  
Viena (Austria), 28 agosto - 1 septiembre
29. *Bounds on 3+1 active-sterile neutrino oscillations in very low reheating scenarios*  
S. Pastor  
18th Int. Conference on Topics in Astroparticle and Underground Physics (TAUP 2023)  
Viena (Austria), 28 agosto - 1 septiembre
30. *New physics implications of COHERENT data*  
V. De Romeri  
TeV Particle Astrophysics (TeVPA 2023)  
Nápoles (Italia), 11-15 septiembre
31. *Constraining new physics scenarios with COHERENT data*  
G. Sánchez García  
L International Meeting on Fundamental Physics and XV CPAN days  
Santander, 2-6 octubre
32. *95 GeV excess within the scotogenic scenario*  
V. Martín Lozano  
L International Meeting on Fundamental Physics and XV CPAN days  
Santander, 2-6 octubre
33. *SMEFT goes dark*  
M. Hirsch  
20th MultiDark Workshop  
Gandia, 25-27 octubre
34. *COHERENT production of a dark fermion*  
P. Muñoz Candela  
20th MultiDark Workshop  
Gandia, 25-27 octubre

35. *NRSMEFT and long-lived HNLs*  
M. Hirsch  
Bethe Forum on Long-Lived Particles  
Bonn (Alemania), 13-17 noviembre
36. *The neutrino-DM connection*  
J.W.F. Valle  
8th IBS-MultiDark-ICTP workshop  
IFT Madrid, 13-17 noviembre
37. *Neutrino masses and mixings and beyond*  
M. Tórtola  
Iranian Conference on High Energy Physics (IRCHEP 1402)  
conferencia remota, 20-22 noviembre
38. *Coherent elastic neutrino-nucleus scattering in the Standard Model and beyond*  
V. De Romeri  
8th Colombian Meeting on High Energy Physics (ComHEP)  
Ibagué (Colombia), 4-7 diciembre
39. *Three neutrino phenomenology and global analyses*  
M. Tórtola  
Prospects in Neutrino Physics (NuPhys 2023)  
Londres (Reino Unido), 18-20 diciembre
40. *Hunting for the cosmic neutrino background*  
J. Shergold  
Prospects in Neutrino Physics (NuPhys 2023)  
Londres (Reino Unido), 18-20 diciembre

### **Tesis de máster**

1. *Aspects of the phenomenology of a  $Z'$  boson: LHC and dark matter detection*  
Adrián Terrones Aragón  
Máster en Física Avanzada, Universidad de Valencia  
Dirigida por Víctor Martín Lozano  
Fecha lectura: 17 julio
2. *Trinification: lepton number and neutrino masses*  
Javier Pérez Soler  
Máster en Física Avanzada, Universidad de Valencia  
Dirigida por Avelino Vicente  
Fecha lectura: 14 septiembre

### **Tesis doctorales**

1. *Neutrino properties from the laboratory and the cosmos*  
Pablo Martínez Miravé  
Universidad de Valencia  
Dirigida por Mariam Tórtola  
Fecha lectura: 19 septiembre



2. *Neutrino masses and lepton flavor physics beyond the Standard Model*  
Pablo Escribano Valiente  
Universidad de Valencia  
Dirigida por Avelino Vicente  
Fecha lectura: 29 septiembre

### Cursos impartidos

1. *Neutrino physics*  
J.W.F. Valle  
6th Chilean School of High Energy Physics  
Universidad Técnica Federico Santa María, Valparaíso (Chile), 16-19 enero
2. *Numerical tools for particle physics and cosmology*  
A. Vicente  
Particle Physics and Cosmology in the Himalayas (BCVSPIN 2023)  
Universidad de Katmandú (Nepal), 15-25 mayo
3. *Neutrino physics*  
M. Tórtola  
International Summer Workshop on High Energy Physics (TAE 2023)  
Benasque, 3-16 septiembre
4. *Introduction to supersymmetry (online)*  
M. Hirsch  
Universidad Técnica Federico Santa María  
Valparaíso (Chile), septiembre-noviembre

### Coloquios y seminarios impartidos

- *Solar neutrinos: Shedding light on neutrino properties*  
P. Martínez-Miravé  
IFIC Valencia, 24 enero
- *Coherent elastic neutrino-nucleus scattering in the Standard Model and beyond*  
V. De Romeri  
Institute for Particle Physics Phenomenology, Durham (Reino Unido), 9 febrero 2023
- *Coherent elastic neutrino-nucleus scattering in the Standard Model and beyond*  
V. De Romeri  
Latin American Webinars on Physics. Seminario virtual, 15 febrero
- *Coherent elastic neutrino-nucleus scattering in the Standard Model and beyond*  
V. De Romeri  
Helsinki Cosmology seminars, Univ. Helsinki (Finlandia), 1 marzo
- *Coherent elastic neutrino-nucleus scattering in the Standard Model and beyond*  
V. De Romeri  
Università degli Studi di Torino & INFN, Turín (Italia), 13 marzo

- *Neutrino oscillations in the standard three neutrino framework and beyond*  
M. Tórtola  
Università degli Studi di Torino & INFN, Turín (Italia), 5 mayo
- *Dynamical origin for the scoto-seesaw mechanism (online)*  
J. Leite  
Universidad Técnica Federico Santa María, Valparaíso (Chile), 31 mayo
- *Collider searches for Heavy Neutral Leptons: beyond simplified scenarios*  
P. Escribano  
IFIC Valencia, 7 junio
- *Discrete Flavor Symmetries and Neutrino Mass Mechanisms*  
O. Medina  
University of Mississippi (Estados Unidos), 28 agosto
- *Coherent elastic neutrino-nucleus scattering in the Standard Model and beyond*  
V. De Romeri  
High energy physics colloquia, Univ. Cagliari (Italia), 27 septiembre
- *Exploring heavy neutral leptons at the LHC: phenomenology beyond the minimal scenario*  
R. Beltrán  
University College London (Reino Unido), 27 octubre
- *Quark-Lepton Mass Relations from Modular Flavor Symmetry*  
O. Medina  
University of California, Riverside (Estados Unidos), 7 noviembre  
University of California, Irvine (Estados Unidos), 9 noviembre  
Oklahoma State University (Estados Unidos), 16 noviembre  
Texas A&M University (Estados Unidos), 28 noviembre  
University of Texas, Austin (Estados Unidos), 30 noviembre
- *Coherent elastic neutrino-nucleus scattering in the Standard Model and beyond*  
V. De Romeri  
Univ. Granada, 10 noviembre
- *Neutrinos and the Prospects for New Physics*  
J.W.F. Valle  
Coloquio remoto, Dublin Institute for Advanced Studies (Irlanda), 23 noviembre
- *A dynamical origin for the scoto-seesaw mechanism*  
J. Leite  
Jožef Stefan Institute, Liubliana (Eslovenia), 5 diciembre
- *Impact of CEvNS measurements on the neutrino floor and DSNB-boosted dark matter*  
V. De Romeri  
Univ. Antioquia, Medellín (Colombia), 12 diciembre